ATTACHMENT 14
SUBPART X UNITS

14.1 GENERAL PROCESS REQUIREMENTS OF SUBPART X UNITS

The US Army Chemical Agent Munitions Disposal System (CAMDS) treatment units are designed to test new equipment and new methods for demilitarizing different types of chemical munitions. The Subpart X Units include:

- Two PAS Brine Drum Dryers, D-1A and D-1B
- PAS Brine Evaporator
- Rocket Shear Machine (RSM)
- Multipurpose Demilitarization Machine (MDM)
- Projectile/Mortar Disassembly Machine (PMD)
- Bulk Drain Station (BDS)
- Two Material Decontamination Chamber 2 (MDC2) units
- Rocket Separation Machine (APE1240)
- Instrumented Ton Containers (ITCs)

14.2 BRINE DRUM DRYERS

14.2.1 Purpose

The Brine Drum Dryers dry liquid PAS brine waste previously treated in the Brine Evaporators. After treatment in the dryers, the dried salts must pass the paint filter test and be analyzed for the presence of TCLP metals. The dried salts are then packaged and transported to an approved hazardous waste disposal facility.

14.2.2 Description and Operation

There are two Brine Drum Dryer units at CAMDS, units D-1A and D-1B. Each Brine Drum Dryer unit consists of two identical rotary twin drums. Each drum is 3-1/2 feet in diameter and 10-feet long. The rotating drums are fed by a splash paddle that splashes brine onto the drums at a rate of approximately 540 gallons per hour each. The rotating drum is internally heated by steam. A long knife blade is installed opposite the splash feed to scrape the dried salt from the drum. The output of each dryer is approximately 80 lbs. of salt per hour for a total of 160 lbs of salt per hour from both. The dried salt drops onto a conveyor and is transferred to a station for filling containers.

The evaporated water is exhausted from the top of the dryer housing through a PAS system to the atmosphere. The PAS system consists of two Whirl/wet dust collectors that operate by the intensive mixing of the air stream, particulate, and scrubbing liquids. The airflow through these units is approximately 3000 cfm, which creates a differential pressure of 8” w.c. internally. The particulate collection system is capable of collecting soluble and insoluble particulate, one micron and above in size, with 96% to 99% removal efficiency. The particulate and water collected by the Whirl/wet are drained to a collection sump by an operator. The sump contents are circulated to the brine feed tank and dried by the Brine Dryers.
The salt is placed in approved hazardous waste containers or in a rollaway dumpster. It is then moved to a permitted or 90 day storage area until transported to an approved RCRA

Sub Title C Landfill. The Drum Dryers are controlled by a PLC and there are no system interlocks with other site operations.

14.2.3 Location

The Brine Drying System is located in the Brine Drying Area (BDA), building C-7066 in the northwest corner of the CAMDS Site.

14.2.4 Safety procedures for maintenance workers repairing equipment

The facility housing the BDA is equipped with telephones for site wide communication. Personnel are able to use this system to summon assistance in an emergency. The BDA is also equipped with flashing blue lights to indicate that the phone is ringing and a flashing red light to indicate an agent alarm. The telephone accesses the public address system, which provides immediate means of contacting all personnel at the CAMDS Site in the event of an emergency. Instrumentation alarms signal on the local control panels in the BDA, and a common trouble alarm signals at the CMO.

14.3 Brine Evaporator

14.3.1 Purpose

The evaporator is used to concentrate Pollution Abatement System (PAS) liquid brines contained in storage tanks in the Brine Drying Area.

14.3.2 Description and Operation

The evaporator consists of a shell and tube heat exchanger, a flash tank recirculation pump, and a concentrate pump. Liquid PAS brine is pumped into the evaporator's holding tank. From the holding tank, liquid PAS brine is run through the heating chamber, boiling the liquid and converting it to steam. The steam is allowed to escape up a stack, while heavier particulates drop to the bottom. The purpose is to remove a minimum of 50% of the water, and obtain a specific gravity of 1.5. Electronic sensors measure the density of the liquid and discharge it to one of the BDA tanks for later processing in the dryers.

The water vapor is exhausted through a gas/liquid separator and stack to the atmosphere. The gas/liquid separator will remove 99% of the entrained liquid and solids where particulate size exceeds 10 microns. The separation is accomplished by curved stationary blading causing the gas stream to enter a controlled centrifugal flow. This action forces the entrained liquids and solids to the outer wall. The output from the cyclone ultimately goes back to the dryers.

14.3.3 Location

The Brine Evaporator is located in the BDA, building C-7066 in the northwest corner of the CAMDS site.

14.3.4 Safety procedures for maintenance workers repairing equipment

The facility housing the Brine Evaporator is equipped with telephones for site wide communication. Personnel are able to use this system to summon assistance in an emergency. The BDA is also equipped with flashing blue lights to indicate that the phone is ringing and a flashing red light to indicate an agent alarm. The telephone access the public address system, which provides immediate means of contacting all personnel at the CAMDS Site in the event of an emergency. Instrumentation alarms signal on the local control panels in the BDA, and a common trouble alarm signals at the CMO.

14.4 ROCKET SHEAR MACHINE

14.4.1 Purpose

The Rocket Shear Machine (RSM) is used to shear M55 rockets prior to feeding them to the Deactivation Furnace System (DFS) for incineration.

14.4.2 Description and Operation

The rockets enter the Explosive Containment Cubicle (ECC#1) and are drained of chemical agent and segmented to ensure controlled burning of all combustible components. Draining and segmenting operations are done by the RSM. The drained agent is collected in holding tanks.

The explosive portions of the rocket and any residual agent are immediately fed to the DFS and incinerated. Metal parts and fiberglass from the rocket shipping tube are also decontaminated in the heated DFS and discharge conveyor of the DFS. The heated discharge conveyor allows further retention time at 1000 °F.

The spent decontamination solutions from the ECC are collected and incinerated or sent to permitted hazardous waste storage tank prior to incineration.

14.4.3 Location

The RSM is located in the DFS Facility, building C 7035 of the CAMDS site.

14.4.4 Safety procedures for equipment breakdown and malfunction

Contaminated air is drawn into particulate filters and activated carbon beds, while fresh air is drawn into the affected area. Back draft dampers are used to prevent reverse flow and isolate toxic areas in the event of inadequate airflow. Panels and alarms in the CMO indicate air pressure in ventilated areas and flow through the site filters.

A combination of remote monitoring and computer control allows inspection and verification of each functional step in the demilitarization process. For example, a CCTV in the RSM allows operators to observe remote-controlled conveyor transfer sequences through the system.

14.4.5 Safety procedures in the event of an exploded munition

All ignitable material treated, stored, or disposed of at CAMDS is segregated by type and protected from open flame, smoking, cutting and welding areas, hot surfaces, frictional heat, sparks (static, electrical, or mechanical), exothermic chemical reactions, or radiant heat.

Structures in which munitions are demilitarized are designed to contain detonations and deflagration in the unlikely event of an occurrence. The ECC is capable of safely retaining fragments and chemical agents from an explosion of the worst-case munition during the demilitarization process.

14.4.6 Safety procedures for maintenance workers repairing equipment

All testing operations that are considered hazardous are conducted within an Explosive Containment Cubicle (ECC#1).

All systems are enclosed in shrouds and ventilated. Areas where the possibility of liquid agent contamination is moderate to high are ventilated at a rate of not less than 20 air changes per hour. Areas where there is low probability of agent contamination are ventilated at not less than six air changes per hour. The ventilation systems all pull air from the 20-air change per hour area, which, in turn, pulls air from the 6 air change per hour areas.

The CAMDS operating areas where agent could be present have been evaluated and assigned a specific hazard designation. These assigned hazard designations are conspicuously posted to prevent operator entry into a contaminated area without appropriate protective clothing. The designations range from Category A (most hazardous) to Category F (least hazardous).

14.4.7 Munition drain procedure

The drained agent is pumped from one munition at a time. This verifies the Munition is drained, before vessel is emptied to receive the agent from the next munition.

14.5 MULTIPURPOSE DEMILITARIZATION MACHINE

14.5.1 Purpose

The Multipurpose Demilitarization Machine (MDM) is a machine designed to perform a variety of robotics support for the processing of chemical agent filled munitions.

14.5.2 Description and Operation

The MDM is used for demilitarizing nonexplosive munitions only. The equipment is designed to remove chemical agents from nonexplosive configured projectiles and cartridges

The MDM conveyor transports the projectiles to the indexing conveyor; the projectile

fixture is clamped against the guardrail to align it with the Pick and Place System (PPS). The PPS is a linear robot, which transfers the projectiles from the projectile fixture on the indexing conveyor to the MDM.

The MDM consists of a six-position rotary-indexing table (RIT) where up to four demilitarization operations can be performed simultaneously. The six positions include:

Station 1 - Load/Unload Station
Station 2 - Empty
Station 3 - Nose Closure Removal Station (NCRS)
Station 4 - Bore Station (BS)
Station 5 - Pull and Drain Station (PDS)
Station 6 - Crimp Station (CS)

Station 1 - Load/Unload Station will use a sensor to detect the presence of the projectile on the Load/Unload Station. It signals the PLC to turn the Rotary Index Table, which positions the projectile at station 2.

Station 2 - This station is not used; the projectile waits at this station until another projectile is loaded into the Load/Unload Station. Then it is rotated to station 3.
Station 3 - The NCRS consists of a hydraulic operated, high torque impact wrench assembly and burster sensor. The projectile is positioned under the hydraulic wrench and then clamped. The wrench is lowered and the jaws close on the closure plug. As the wrench rotates, it slowly rises until the nose closure is free. The projectile is positioned under the burster probe, which lowers into the projectile burster well to assure that no burster is present. After completion of the operation at the NCRS, the projectile is rotated to station four.

Station 4 - The BS Station is normally bypassed and the projectile continues on to station five unless the projectile lot was determined to have welded burster wells. The BS consists of an electrically driven vertical-milling machine. The projectile is positioned under the cutter and clamped. The cutter is used for milling out the welded portion of the burster well press fit area from the projectile to allow the burster well to be pulled at the PDS. The cutter is retracted and the projectile is unclamped and positioned on the Rotary Index Table to be rotated to station five.

Station 5 - The PDS consists of a pull station and a drain station. The projectile is first positioned under the pull station to allow the burster well to be removed from the projectile. The burster well is then removed by an expandable collet inserted into the burster well. When the collet is expanded, serrated teeth bite into the interior of the burster well wall. The burster well is removed from the projectile and remains on the collet while the agent drain process is occurring. If the burster well is not pulled, additional tries will be attempted. If these attempts are not successful, the projectile will be ultimately reprocessed commencing with the BS. The projectile is then positioned to allow the agent drain tube to enter the projectile cavity. The agent is pumped from the agent cavity and transferred to a storage tank for later disposal. The projectile is then repositioned to allow the burster well to be reinserted into the projectile body and stripped from the collet. Both the collet and drain tubes have drip collection devices, which collect agent dripping from the burster well, and drain tube. The projectile is indexed to the station six.

Station 6 - The Crimp Station removes the burster well from the projectile by an expandable collet. A set of jaws will partially deform the burster well at the lower portion of the press fit area before it is reinserted into the projectile. This operation is required to provide an egress route between the burster well and the projectile body for the gas generated by the agent residue while the projectiles are under going thermal decontamination. The projectile is returned to Load/Unload Station where it is transferred back to the indexing conveyor.

14.5.3 Location

The MDM is located within a toxic enclosure in the Multipurpose Demilitarization Facility (MDF).

14.5.4 Safety procedures for equipment breakdown and malfunction

Contaminated air is drawn into particulate filters and activated carbon beds, while fresh air is drawn into the affected area. Back draft dampers are used to prevent reverse flow and isolate ventilated areas in the event of inadequate airflow. Panels and alarms in the CMO indicate air pressure in ventilated areas and flow through the charcoal filters.

A combination of remote monitoring and computer control allows inspection and verification of each functional step in the demilitarization process. For example, a CCTV in the MDM allows operators to observe remote-controlled conveyor transfer sequences through the system.

14.5.5 Safety procedures for maintenance workers repairing equipment

All systems are enclosed in shrouds and ventilated. Areas where the possibility of liquid agent contamination is moderate to high are ventilated at a rate of not less than 20 air changes per hour. Areas where there is low probability of agent contamination are ventilated at not less than six air changes per hour. The ventilation systems all pull air from the 20-air change per hour area, which, in turn, pulls air from the 6 air change per hour areas.

The CAMDS operating areas where agent could be present have been evaluated and assigned a specific hazard designation. These assigned hazard designations are conspicuously posted to prevent operator entry into a contaminated area without appropriate protective clothing.

14.5.6 Munition drain procedure

A combination differential pressure level sensor/drain probe is inserted into the projectile. The munition is drained until the regulated level is reached, plus a short time delay, before the agent valve is closed and the differential drain probe is removed. A projectile is verified drained when the differential drain probe reads less than or equal to the amount of agent allowed for each munition. The amount of agent allowed to remain in each munition after draining and before processing in the MPF is detailed in the MPF feed rate tables in Modules V and VI.

14.6 THE PROJECTILE/MORTAR DISASSEMBLY MACHINE

14.6.1 Purpose

The Projectile/Mortar Disassembly System (PMD) is an electrically, pneumatically, and hydraulically operated machine designed to remove explosives and other major components from several types of chemical munitions which are to be demilitarized.

14.6.2 Description and Operation

The PMD is a multipurpose machine designed to remove explosive and miscellaneous components from a variety of chemical-filled munitions. The electrically, pneumatically, and hydraulically operated PMD can remove the nose closures, fuzes, bursters, supplementary charges, spacers, fuze well cups, and support cups from the following chemical munitions:

105MM	(M60)
105MM	(M360)
155MM	(M110/M104)
155MM	(M121, M121A1 and M122)
8 inch	(M426)
4.2 inch	(M2A1)

The PMD consists of five operating stations oriented around a centrally located Rotary Index Table (RIT). This allows munitions to be sequentially loaded, processed, and unloaded. The RIT enables simultaneous operations to be performed after table loading has occurred. The five operating stations and the functions they perform are as follows:

Station 1 - Munition In-Feed Transfer Station (MITS)
Station 2 - Nose Closure Removal Station (NCRS)
Station 3 - Miscellaneous Parts Removal Station (MPRS)
Station 4 - Burster Removal Station (BRS)
Station 5 - Munition Discharge Station (MDS)

Station 1 - The Munition In-Feed Transfer Station: Munitions are laterally aligned with the PMD input conveyor, which moves the munition toward the RIT. As it approaches the table, an overhead pusher assembly moves on an overhead track and pushes the munition onto a table fixture called a “saddle”. A sensor detects proper positioning and then rotates the index table clockwise (as viewed from above) until the munition is indexed into position with the NCRS.

Station 2 - The Nose Closure Removal Station (NCRS): The projectile body is securely clamped while a chuck assembly moves forward surrounding the nose closure. The chuck jaws are then closed and chuck is rotated counterclockwise a number of times sufficient to completely unscrew the nose closure from the projectile body. After the nose closure has been unscrewed, and completely freed from the projectile body, the carriage is retracted, the chuck jaws are opened and a spring loaded ejector forces the nose closure out of the jaws into a discharge chute. This chute guides the nose closure onto the component transfer conveyor for transfer to the fuze burster out tray.

If the munition being processed is a mortar, the burster is attached to the fuze and both will be removed together. The mortar body is clamped while a chuck assembly moves forward surrounding the fuze. The chuck grasps the fuze and, rotating counterclockwise, unscrews it from the mortar body. Retracting part way, the chuck pulls the fuze/burster assembly from the body. The fuze/burster assembly will then either be transported intact out of the Explosive Containment Cubicle #2 (ECC #2) in the Equipment Test Facility (ETF) where the PMD is located, or disassembled according to the following method. The mortar gripper assembly lowers and grasps the burster in its jaws. The chuck again rotates, unscrewing the fuze from the burster. The burster is then released into a discharge chute, which guides it to the component transfer conveyor. Next, the carriage is retracted, the chuck jaws are opened and a spring loaded ejector forces the fuze out of the jaws into a discharge chute. The chute guides the fuze and burster to the component transfer conveyor, which transfers them to the fuze/burster out trays.

ALTERNATE METHOD - A cutter system that will replace the Chuck Assembly of the PMD NCRS at Station 2.

The Cutter System cuts the fuze adapter assembly from the projectile body allowing access to the miscellaneous components in the projectile. Removal of the miscellaneous components is the same whether the Cutter System or Chuck Assembly is used.

Station 3 - The Miscellaneous Parts Removal Station. After a projectile arrives at this station, parts existing between the nose closure or fuze and the burster will be removed. Some projectile models do not contain miscellaneous parts, in which case processing would not occur at this station. The MPRS has three separate component configurations, depending on the type of munitions being processed. The 105MM - M60 and 155MM - M110 projectiles are configured with an expandable collet used to grasp the threaded fuze well cup, unscrew and remove it. The 155MM - M121A1 uses a magnet to remove the supplemental charge and cup and the 8-inch projectile will have a gripper assembly to grab and remove the cardboard filler, supplemental charge, and supplemental charge support. After the miscellaneous components fuze well cup have been removed, the projectile body is unclamped and the index table rotates, positioning the munition at the BRS.

Station 4 - The Burster Rotating Adapter. A hollow tube is pressed against the end of the burster and the projectile opening is sealed, then air pressure is applied around the burster. The hollow tube is vented to the atmosphere. This results in a relative pressure difference between the end of the burster and the rest of the burster. This effectively forces the burster out of the projectile when the tube is retracted. A collet grips the burster, retracts, and pulls the burster out of the projectile body. The jaws of the burster transfer assembly grip the burster, which is then released by the collet. The transfer assembly carries the burster to a transfer chute where it is released and guided to the burster conveyor then removes it from the processing area. If mortars are being processed, this station is not used.

(a) Air is compressed to 100 psig and applied to the Delta P Head to remove the burster. If the first attempt fails, the program calls for two additional tries at 300 psig. If it fails to remove the burster after the third attempt, the projectile is rejected, and a determination will be made whether to try the Burster Rotating Adapter or send the

munition back to storage.

(b) When bursters are stuck and air cannot get behind to force the burster out, a Burster Rotating Adapter is implemented to break loose the stuck burster. It has four sharp teeth on the forward end, which makes contact with the burster casing. The hydraulic cylinder is cushioned which prevents sudden impact of the Burster Rotating Adapter to the burster. Hydraulic pressure is set at 750 psig so the teeth can slightly penetrate the end of the burster case.

Station 5 - The Munition Discharge Station. The index table positions the projectile body at the output/unload station. When the projectile output tray is retracted to the unload position, a hydraulic pusher pushes the projectile off the tray causing it to roll into a tip up fixture. The fixture then positions the projectile body to an upright position. A new gasket will be placed on a nose closure and reinstalled, hand tight, on the projectile body when required. With the aid of a jib crane, the projectile will be placed into a partitioned container called an egg crate and conveyed into a monitoring airlock in the ETF Vestibule Area. After monitoring, the projectiles are removed from the monitoring airlock, placed on wooden pallets and transferred to storage or to the MDF for further processing.

14.6.3 Manual Downloading of 4.2-inch Mortars - Fuze/burster Assembly Removal

Operators will secure a 4.2-inch mortar to a holding fixture. The fuze/burster assembly will be unscrewed from the mortar and removed. The burster cavity will be monitored for agent to ensure that the unit is not leaking. A plug will then be placed in the cavity to seal the burster cavity. The non-burstered mortars and fuze/burster assemblies will then be repacked in separate containers.

This operation will be performed manually in a Vestibule Area adjacent to one of the Explosive Containment Cubicles (located in the ETF or in the SEG/UPA building).

14.6.4 Manual Reconfiguration of 4.2-inch Mortars - Tail Assembly Removal

An operator will loosen the cap of the 4.2-inch mortar fiber storage tube and monitor the munition for agent. The mortar will be removed from the fiber tube. The tube and mortar will be placed on the conveyor and moved to the second step where the wafer of propellant will be removed. The wafer propellant will be placed in a metal drum. The mortar will continue to the third step where an operator will remove the ignition cartridge and place it in an ammunition can. The mortar will continue to the fourth step where two operators will remove it from the conveyor, place it in an APE 1002M3 machine, remove the tail sections, and place each piece in a separate container. Mortars will then be placed in a specialized storage container.

Operators will perform this task manually in the ETF.

14.6.5 Location

The PMD is located within the ETF ECC#2 and is remotely operated by either automatic or manual control.

14.6.6 Safety procedures for equipment breakdown and malfunction

Contaminated air is drawn into particulate filters and activated carbon beds, while fresh air is drawn into the affected area. Back draft dampers are used to prevent reverse flow and isolate toxic areas in the event of inadequate airflow. Panels and alarms in the CMO indicate air pressure in ventilated areas and flow through the filters.

A combination of remote monitoring and computer control allows inspection and verification of each functional step in the demilitarization process. For example, a CCTV in the PMD allows operators to observe remote-controlled conveyor transfer sequences through the system.

14.6.7 Safety procedures for maintenance workers repairing equipment

All systems are enclosed in shrouds and ventilated. Areas where the possibility of liquid agent contamination is moderate to high are ventilated at a rate of not less than 20 air changes per hour. Areas where there is low probability of agent contamination are ventilated at not less than six air changes per hour. The ventilation systems all pull air from the 20-air change per hour area, which, in turn, pulls air from the 6 air change per hour areas.

The CAMDS operating areas where agent could be present have been evaluated and assigned a specific hazard designation. These assigned hazard designations are conspicuously posted to prevent operator entry into a contaminated area without appropriate protective clothing.

14.7 BULK DRAIN STATION

14.7.1 Purpose

This Bulk Drain Station (BDS) consists of a mainframe assembly, an item-transfer conveyor, a punch station, and a drain station. Load cells are mounted on the hydraulic cylinders as part of the conveyor. The drain station employs a combination differential-pressure level sensor/ drain probe for extraction of agent from bulk items.

14.7.2 Description and Operation

The BDS is designed to punch and drain the agent from:

500 pound MK-94 bombs	13 units per hour
750 pound MC-1 bombs	9.8 units per hour
One-ton containers	2.9 units per hour
TMU 28/B spray tanks	2.9 units per hour
MK-116 Weteye Bombs	40 units per hour

These bulk containers are weighed prior to draining and after draining by load cells to obtain the full and empty weights of each container. The agent drain probe is equipped with a level sensor, which is used to verify that the residual agent heel remaining in the bulk item complies with MPF agent feed limits. The items are then transferred from the BDS onto a connecting conveyor for subsequent transfer and processing in the MPF after draining.

Items to be processed in the BDS are received from the connecting input conveyor (not part of BDS) and transferred onto the BDS conveyor assembly. All items are received and processed in metal holding cradles. The ton containers and spray tanks are processed one at a time. The holding cradles hold three bombs (MK-94, MC-1, or MK 116).

14.7.3 Ton containers, Spray Tanks or Weteye bombs

Items are moved to the punch station by the BDS conveyor. Sensor targets are located on the side of the cradles. These sensors located on the conveyor are used to position the container at the punch and drain station. The sensors are also used to slow the conveyor and to stop the cradle at the correct location on the item for punching and draining. When the item is stopped at the punch station, the conveyor is hydraulically lowered to allow the tray to rest on the main frame. A 2 ¼" hole is punched on each end of the ton container by a hydraulically operated cylinder equipped with hardened punches. When the punching function is completed and the punch has retracted, the conveyor assembly will automatically rise and move the item to the drain station. The drain station electronic sensor stops the item at the correct location.

(a) Items are weighed on the conveyor weight station by a set of four load cells prior to draining agent and after the agent is drained. Weighing is accomplished by electronically actuating the load cells (with conveyor in its raised position).

(b) A combination differential pressure level sensor/drain probe is lowered into the item by means of a hydraulically driven screw. The probe extends through the punched hole to a preset depth inside the interior of the item. Draining is started as soon as the drain probe makes contact with the agent during its descent into the item. The agent is drained from the agent cavity and transferred to a storage tank or other container for later disposal. An operator in the MDM control room visually observes the drain probe as it is lowered into the bulk item to verify that it is on the bottom of the container. The differential pressure level sensor must read empty plus a time delay (two minutes for ton containers) before the container is verified drained (less than 5% agent heel or the amount demonstrated during MPF trial burn) and the differential drain probe is removed from the container.

(c) The item is reweighed by the load cells and the agent weight is obtained by

comparing the full and drained weights. The item is then moved (including cradle and tray) onto the connecting conveyor for subsequent processing in the MPF.

14.7.4 MK-94 and MC-l Bombs

The tray and cradle containing two bombs are moved by the BDS conveyor to the punch station. The first bomb is moved into the punch station. Electronic sensors located on the outer side rail of the conveyor frame of the punch and drain stations control the cradle and stop the items at the correct locations for punching and draining. When the punch sensor is actuated by the target, the conveyor stops and the conveyor assembly is hydraulically lowered to allow the tray under the bomb cradle to rest on the main frame assembly during punching. A hole is provided by punching the fill plug of the first bomb by a hydraulically operated cylinder equipped with a hardened punch. When the punch cylinder rod has retracted, the conveyor assembly is raised and moves the first bomb into the drain station.

(a) Prior to agent draining, the conveyor, tray, cradle, and bombs are weighed by a set of four load cells. These load cells are mounted between the conveyor assembly lower frame and the hydraulic cylinders used to raise and lower the conveyor assembly. Weighing is accomplished by electronically actuating the load cells (with the conveyor in its raised position).

(b) Draining is accomplished and verified complete as described above in paragraph 14.7.3(b).

(c) The item is reweighed by the load cells and the agent weight is obtained by comparing the full and drained weights.

(d) The second bomb is moved into punch position, the conveyor lowered and the bomb punched. The conveyor is raised and the second bomb is moved to the drain station, and the weighing operation is performed. The draining operation is performed and the weighing operation is repeated. The conveyor assembly moves the bombs (including cradle and tray) onto the conveyor for subsequent processing in the MPF.

14.7.5 Location

The BDS is located within MDM Processing area of the MDF.

14.7.6 Safety procedures for equipment breakdown and malfunction

Contaminated air is drawn into particulate filters and carbon beds, while fresh air is drawn into the affected area. Back draft dampers are used to prevent reverse flow and isolate toxic areas in the event of inadequate airflow. Panels and alarms in the CMO indicate air pressure in ventilated areas and flow through the filters.

A combination of remote monitoring and computer control allows inspection and verification of each functional step in the demilitarization process. For example, a CCTV in the BDS allows operators to observe remote-controlled conveyor transfer sequences through the system.

14.7.7 Safety procedures for maintenance workers repairing equipment

All systems are enclosed in shrouds and ventilated. Areas where the possibility of liquid agent contamination is moderate to high are ventilated at a rate of not less than 20 air changes per hour. Areas where there is low probability of agent contamination are ventilated at not less than six air changes per hour. The ventilation systems all pull air from the 20-air change per hour area, which, in turn, pulls air from the 6 air change per hour areas.

The CAMDS operating areas where agent could be present have been evaluated and assigned a specific hazard designation. These assigned hazard designations are conspicuously posted to prevent operator entry into a contaminated area without appropriate protective clothing.

14.7.8 Bulk Containers drain procedure

A combination differential pressure level sensor/drain probe (it is composed of these two parts) is inserted into the container. To prevent this probe from getting plugged because of sludge in the bottom of the container, the probe is inserted into the container in steps. This is accomplished by using the reading from the differential probe to control how far the probe is inserted and maintained in the liquid. If the probe does not detect any liquid, the process is stopped and the differential pressure level sensor and drain probe are purged separately. This is a manual operation by the operator. The procedure is then retried. If the probe becomes plugged at anytime during the draining process, it can be purged manually by the operator. The differential drain probe is inspected during the draining process by an operator to verify that it is on the bottom of the container. The differential pressure level sensor must read empty plus a time delay (two minutes for ton containers) before the container is verified drained and the differential drain probe is removed from the container.

14.8 MATERIAL DECONTAMINATION CHAMBER 2 (MDC2)

14.8.1 Purpose

The MDC2 is used to treat contaminated DPE suits and associated boots, gloves, and aprons. In addition, discarded butyl rubber can also be treated in this unit. MDC2 unit B is used for treating agent contaminated DPE and associated boots, gloves, and aprons.

14.8.2 Description and Operation

Each of the two MDC2 units are identical. The MDC 2 units are designed as a treatment unit capable of removing residual chemical agent from DPE suits and other butyl rubber items through the process of recirculating heated air. Each unit is a sealed metal chamber attached to a recirculating airflow system, which is fitted with a carbon tray filter to remove contamination vapors during treatment.

The chamber consists of a structural steel frame, fully welded inner wall assembly with heating coils and ductwork, insulation, and outer skin of sheet metal. The general design specifications of the chamber are:

1. Chamber dimensions:

Work space (interior)	8'-4" long x 8'-0" wide x 8'-0" high
External (overall)	13'-0" long x 8'-8" wide x 8'-8" high
2. Inner wall material:	18 gauge Carbon Steel, primed & painted
3. Exterior material:	18 gauge Aluminized Steel
4. Air duct heaters:	21 electric coil elements, 105 KW
5. Chamber Insulation:	4 inches thick (8# density mineral wool)
6. Operating temperature range:	Ambient to 470°F
7. Recirculation fan:	
Capacity	5600 CFM
Motor	3 HP
Type	New York Blower Plug PLR Wheel
Size	18
8. Powered exhaust fan:	
Capacity	500 CFM (approx)
Motor	¾ HP
Type	New York Blower Junior
9. Power supply	480V / 3-phase, 60 hz, A/C
10. Access Door	Double side, swing door

The recirculation fan moves heated air through the chamber, ductwork and the filter system at flow rates of 0 to 3,000 actual cubic feet per minute (acfm). Ducts along the chamber walls, equipped with diffusers, supply air from the recirculation fan uniformly across the contaminated items. A duct on the ceiling carries return air back to the fan inlet through electric heating coil elements. The MDC 2 operating temperature range will be ambient to 375°F. The recirculation system is fitted with a carbon tray filter to remove contamination vapors from the air as it is recycled through the duct system. The air in the MDC 2 will be pulled to the CAMDS Site filter farm during cool down using the exhaust fan.

14.8.3 Location

The MDC 2 unit A is located in the Material Treatment facility (MTF), building C7025 of the CAMDS site. The MDC2 unit B is located in the Ventilated Storage Area, building C7085 of the CAMDS site.

14.8.4 Safety procedures for maintenance workers repairing equipment

All systems are enclosed in shrouds and ventilated if there is any possible agent leakage in facility housing. Areas where the possibility of liquid agent contamination is moderate to high are ventilated at a rate of not less than 20 air changes per hour. Areas where there is low probability of agent contamination are ventilated at not less than six air changes per hour. The ventilation systems all pull air from the 20-air change per hour area, which, in turn, pulls air from the 6 air change per hour areas. No munitions are processed in this system.

The CAMDS operating areas where agent could be present have been evaluated and assigned a specific hazard designation. These assigned hazard designations are conspicuously posted to prevent operator entry into a contaminated area without appropriate protective clothing. The designations range from Category A (most

hazardous) to Category F (least hazardous). Protective clothing requirements depend on a number of factors including area and type of operations, presence of agent, normal or emergency conditions, etc.

14.9 ROCKET SEPARATION MACHINE (APE 1240)

14.9.1 Purpose

The Rocket Separation Machine (APE 1240) is used to separate M55 rocket motors and warheads.

14.9.2 Description and Operation

The M55 rockets are moved from the CAMDS igloo in a Single Pallet Only Rocket Transport (SPORT) to the Equipment Test Facility. A sample line is attached to monitor the SPORT. Upon two complete cycles of the NRT monitor, with readings less than 0.50 STEL, the interior of the SPORT may be accessed. The lid to the SPORT is removed, banding to M55 rockets cut, and the lid placed back on the SPORT. The SPORT is moved by conveyor into the ETF Vestibule. One rocket in its firing tube is removed or handled at a time. The Rocket is removed from the SPORT by two operators dressed in Level C protective clothing and placed on a storage table in a vise. Operators remove the endcaps and examine ignitor wires. The shunt wire is then removed. The Rocket is removed from shipping tube; fins are locked back and taped. The rocket is carried into the Explosive Containment Cubicle (ECC) #2 and placed in the APE 1240 machine and secured. The ECC door is secured. The machine separates the warhead from the motor while being observed by camera for leaks or problems. When the warhead and motor are separated, the ECC door is opened. The operator passes the warhead to an operator outside the ECC through the “Item Out” door of the ECC. The motor section is taken back out into the Vestibule through the “personnel” door and placed on a pallet.

The warheads are placed back into a simulated shipping and firing tube with a wood spacer put in place of the missing motor assembly. Once the SPORT is filled with repackaged warheads, it is banded; the lid is placed back on the SPORT and locked. The SPORT is moved to the South Interior Airlock for monitoring.

The SPORT is removed from the airlock and a hazardous waste label attached and tracking sheet filled out. The SPORT and hazardous waste tracking sheet are moved to the MHA igloo, and later removed and stored in Area 10.

The Motor assemblies are placed on a special pallet. The motor assemblies are transferred to the South Interior Airlock for monitoring. The pallet is then moved to the repack area of the ETF. Operators dressed in Level E protective clothing with conductive shoes and rubber gloves place each motor assembly in a simulated shipping tube. Reattach the shunt wire and put a wood spacer in place of the warhead and replace the end caps. The Pallet is banded and placed in a SPORT. A hazardous waste label is attached to pallet and hazardous waste tracking sheet filled out. The SPORT and paperwork are moved to the igloo and later removed and stored in Area 10.

14.9.3 Location

The Rocket Separation Machine is located in the ECC of the Equipment Test Facility, (ETF), in building C 7090 of the CAMDS site.

14.9.4 Safety procedures for equipment breakdown and malfunction

Contaminated air is drawn into particulate filters and activated carbon beds, while fresh air is drawn into the affected area. Back draft dampers are used to prevent reverse flow and isolate toxic areas in the event of inadequate airflow.

Monitoring and inspection of each functional step in the separation process is conducted. For example, a CCTV allows operators to observe the sequences of the separation.

14.9.5 Safety procedures in the event of an exploded munition

All ignitable material treated, stored, or disposed of at CAMDS is segregated by type and protected from open flame, smoking, cutting and welding areas, hot surfaces, frictional heat, sparks (static, electrical, or mechanical), exothermic chemical reactions, or radiant heat.

The rocket is shunted after being removed from the firing tube to prevent it from premature ignition.

Structures in which munitions are demilitarized are designed to contain detonations and deflagration in the unlikely event of an occurrence. The ECC is capable of safely retaining fragments and chemical agents from an explosion of the worst-case munition during the demilitarization process.

14.9.6 Safety procedures for maintenance workers repairing equipment

All testing operations that are considered hazardous within an Explosive Containment Cubicle (ECC).

All systems are enclosed in shrouds and ventilated. Areas where the possibility of liquid agent contamination is moderate to high are ventilated at a rate of not less than 20 air changes per hour. Areas where there is low probability of agent contamination are ventilated at not less than six air changes per hour. The ventilation systems all pull air from the 20-air change per hour area, which, in turn, pulls air from the 6 air change per hour areas.

The CAMDS operating areas where agent could be present have been evaluated and assigned a specific hazard designation. These assigned hazard designations are conspicuously posted to prevent operator entry into a contaminated area without appropriate protective clothing. The designations range from Category A (most hazardous) to Category F (least hazardous).

14.9.7 Munition drain procedure

Agent will not be removed in the rocket separation process.

14.10 INSTRUMENTED TON CONTAINERS (ITCs)

14.10.1 Purpose

The purpose of the Instrumented Ton Containers is to test various treatment schemes for in-situ treatment or destruction of chemical agents, and to collect process data.

14.10.2 Description and Operation

The ITCs consist of the basic ton container that has been modified with several ports for attaching sampling tubes that collect samples from various locations inside the ITC, and for connecting temperature sensors for measurement of interior temperatures at various locations. Provisions for mounting exterior temperature sensors are also included. Also, provisions are included for using heat blankets to heat the interior contents.

The vent valve of the ITC will be fitted with a pressure relief system that may include gauges, transmitters, and various pressure relief devices. The pressure relief devices may include devices to capture or scrub agent from vent gases. Drawings of the ITCs and the associated equipment will be provided in the project test plans.

In operation, agent will be transferred to the ITCs and water will be added at various rates to neutralize the VX agent by the hydrolysis reaction. Methods of agitating the reactants will also be employed. Detailed description of the actual operations will be provided in the project test plans.

All hazardous waste treatment will occur in the ITCs. All requirements for RCRA organic emissions regulations will be met for all testing conducted in the ITCs. Any required storage and/or secondary treatment for HW treated in the ITCs will be addressed in the test plans.

14.10.3 Location

The ITCs will be located in the MDF BIF, Agent Drain Bay, building C7047, at the CAMDS site.

14.10.4 Safety Procedures

The BIF Agent Drain Bay is a ventilated area. Contaminated air is drawn into particulate filters and activated carbon beds, while fresh air is drawn into the area. Back draft dampers are used to prevent reverse flow and to isolate ventilated areas in case there is insufficient airflow. Panels and alarms in the Control Module indicate air pressures in ventilated areas and the flows through the carbon filters.